

# **INDOOR AIR QUALITY ASSESSMENT**

**Massachusetts Division of Capital Asset Management  
and Maintenance (DCAMM)  
Energy Group  
One Ashburton Place, 16<sup>th</sup> floor  
Boston, MA**



Prepared by:  
Massachusetts Department of Public Health  
Bureau of Environmental Health  
Indoor Air Quality Program  
April 2017

## Background

<b>Building:</b>	Massachusetts Division of Capital Asset Management and Maintenance (DCAMM), Energy Group
<b>Address:</b>	One Ashburton Place, 16 <sup>th</sup> floor
<b>Assessment Requested by:</b>	Parrish Rossi, Facilities Manager, DCAMM
<b>Reason for Request:</b>	Follow up on previous report; previous visit conducted on March 6, 2017
<b>Date of Assessment:</b>	April 14, 2017
<b>Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment:</b>	Ruth Alfasso, Environmental Engineer, Indoor Air Quality (IAQ) Program
<b>Building Description:</b>	One Ashburton Place, also known as the McCormack Building, is a large state office building built in the 1970s.
<b>Windows:</b>	Not openable

## Methods

Please refer to the IAQ Manual for methods, sampling procedures, and interpretation of results (MDPH, 2015).

## IAQ Testing Results

The following is a summary of indoor air testing results (Table 1).

- ***Carbon dioxide*** levels were below 800 parts per million (ppm) in all areas surveyed, indicating adequate air exchange.
- ***Temperature*** was within the recommended range of 70°F to 78°F in all areas tested.
- ***Relative humidity*** was below the recommended range of 40 to 60% in all areas tested.
- ***Carbon monoxide*** levels were non-detectable (ND) in all areas tested.
- ***Fine particulate matter (PM<sub>2.5</sub>)*** concentrations measured were below the NAAQS limit of 35 µg/m<sup>3</sup> in all areas tested.

## **Ventilation**

A heating, ventilating and air conditioning (HVAC) system has several functions. First it provides heating and, if equipped, cooling. Second, it is a source of fresh air. Finally, an HVAC system will dilute and remove normally-occurring indoor environmental pollutants by not only introducing fresh air, but by filtering the airstream and ejecting stale air to the outdoors via exhaust ventilation. Even if an HVAC system is operating as designed, point sources of respiratory irritation may exist and cause symptoms in sensitive individuals.

Fresh air is supplied by induction units located along the outer edges of the building (Picture 1). Return air is drawn around light fixtures using ducted returns. Fewer induction units had items on them than during the last visit. Induction unit vents should be kept free of items and kept clean.

It is important to note that relative humidity levels in the building would be expected to be low during the winter months due to atmospheric conditions and heating. Low relative humidity can lead to common symptoms such as: dry skin, lips, and scalp; dry/scratchy throats and noses (nose bleeds); exacerbation of asthma, eczema, or allergies; dry/irritated eyes; and irritation of respiratory tract. Due to the change in seasons, relative humidity was higher during this visit than during the March 6, 2017 visit, but was still below the BEH/IAQ comfort level.

## **Microbial/Moisture Concerns**

No water-damaged ceiling tiles or other materials were observed during the visit. Plants were noted in a few areas (Table 1; Picture 1). Plants can be a source of pollen and mold, which can be respiratory irritants to some individuals. Plants should be properly maintained and equipped with drip pans and should be located away from induction units to prevent the aerosolization of dirt, pollen and mold.

Water dispensers were located on carpet; spills can moisten carpet and lead to odors and microbial growth. The area being used as a kitchen also has carpeting, which can become moistened from refrigerator or sink spills. It was reported that there are plans for replacing the carpeting in the kitchen area with tile.

## **Other Concerns**

Exposure to low levels of volatile organic compounds (VOCs) may produce eye, nose, throat, and/or respiratory irritation in some sensitive individuals. BEH/IAQ staff examined spaces for products containing VOCs, noting air fresheners, deodorizers, hand sanitizers, cleaning products, and dry erase materials in a number of areas throughout the office space (Table 1; Picture 2). All of these products have the potential to be irritants to the eyes, nose, throat, and respiratory system of sensitive individuals.

A copy machine that is reportedly heavily used is located in the kitchen area, which is directly adjacent to several occupied areas. Excess heat, odors, VOCs and ozone can be produced by photocopiers, particularly if the equipment is older and in frequent use. Ozone is a respiratory irritant (Schmidt Etkin, 1992). No dedicated exhaust ventilation was observed in this area.

Rodents were reported in this office on an occasional basis. A mousetrap was observed behind some of the cube walls (Picture 3). Rodent infestation can result in IAQ related symptoms due to materials in their wastes. Mouse urine contains a protein that is a known sensitizer (US EPA, 1992). A sensitizer is a material that can produce symptoms (e.g., running nose or skin rashes) in sensitive individuals after repeated exposure. To eliminate exposure to allergens, rodents must be removed from the building. Please note that removal, even after cleaning, may not provide immediate relief since allergens can exist in the interior for several months after rodents are eliminated (Burge, 1995). Once the infestation is eliminated, a combination of cleaning and increased ventilation and filtration should serve to reduce allergens associated with rodents. It was reported that steam cleaning of the carpeting was planned for soon after this visit.

Personal fans observed in some offices appeared dusty, as were the supply and return fins of some of the induction units. This dust can be reaerosolized and is a respiratory and eye irritant. Fans and induction units should be cleaned periodically to prevent aerosolization of dust when the units are activated.

Items were observed on a number of flat surfaces, such as windowsills, tabletops, counters, bookcases, and desks. The large number of items stored in offices provides a source for dusts to accumulate and make it difficult for custodial staff to clean. Items should be relocated and/or be cleaned periodically to avoid excessive dust build up.

## Conclusions/Recommendations

Based on observations at the time of assessment, the following recommendations from the previous report are reiterated:

1. Operate supply and exhaust ventilation continuously in all areas during occupied periods. Ensure all HVAC equipment is cleaned/maintained in accordance with manufacturer's instructions. Avoid blocking HVAC equipment with boxes, furniture or other items.
2. Have the HVAC system balanced every 5 years in accordance with SMACNA recommendations (SMACNA, 1994).
3. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. To control for dusts, a high efficiency particulate arrestance (HEPA) filter equipped vacuum cleaner in conjunction with wet wiping of all surfaces is recommended. Avoid the use of feather dusters. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
4. Keep plants in good condition, avoid overwatering, and remove from the airstream of heating and ventilation equipment.
5. Consider the use of waterproof mats underneath water dispensers to protect carpet.
6. Consider replacing carpeting in the kitchen area with tile.
7. Reduce the use of cleaning products, sanitizers, and other items that contain VOCs.
8. Consider if direct exhaust ventilation is feasible for the kitchen/copy area. Ensure the copy machine is well maintained to reduce VOCs, ozone, particulates and odors.
9. Use the principles of Integrated Pest Management (IPM) and the services of a licensed pest control operator to remove rodents and reduce the potential for pest infestation. Ensure that any area where rodents may have been is thoroughly cleaned to remove allergens.

10. Clean blades of personal fans to prevent aerosolization of dust.
11. Reduce the amount of items stored on flat surfaces to allow regular cleaning.
12. Refer to resource manual and other related IAQ documents located on the MDPH's website for further building-wide evaluations and advice on maintaining public buildings. These documents are available at: <http://mass.gov/dph/iaq>.

## References

Burge, H.A. 1995. *Bioaerosols*. Lewis Publishing Company, Boca Raton, FL.

MDPH. 2015. Massachusetts Department of Public Health. Indoor Air Quality Manual: Chapters I-III. Available at: <http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/>.

Schmidt Etkin, D. 1992. Office Furnishings/Equipment & IAQ Health Impacts, Prevention & Mitigation. Cutter Information Corporation, Indoor Air Quality Update, Arlington, MA.

SMACNA. 1994. HVAC Systems Commissioning Manual. 1<sup>st</sup> ed. Sheet Metal and Air Conditioning Contractors' National Association, Inc., Chantilly, VA.

US EPA. 1992. Indoor Biological Pollutants. US Environmental Protection Agency, Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, research Triangle Park, NC. EPA 600/8-91/202. January 1992.

**Picture 1**



**Induction unit, note plant**

**Picture 2**



**Cleaning wipes and dusty personal fan**



**Picture 3**



**Mousetrap behind cube walls**

**Location: DCAMM Energy Group**

**Indoor Air Results**

**Address: One Ashburton Place, Boston, MA 16<sup>th</sup> floor**

**Table 1**

**Date: 4/14/2017**

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m <sup>3</sup> )	Occupants in Room	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
Background	--	--	--	--	--					Sunny, breezy
Saul	547	ND	73	18	6	2	N	Y	Y	
Thomas	523	ND	73	18	7	1	N	Y	Y	CP, plants, PF
Conference	506	ND	73	18	5	0	N	Y	Y	
Lewin	553	ND	74	18	6	1	N	Y	Y	DEM, PF
Miller	547	ND	74	18	6	2	N	Y	Y	Plant
White	514	ND	74	18	6	0	N	Y	Y	Plant
Harold	526	ND	73	18	5	0	N	Y	Y	PF, CP
Cube next to kitchen	564	ND	73	19	5	0	N	Y	Y	HS, PF
kitchen	520	ND	73	18	5	0	N	Y	Y	Refrigerator and microwave, CP, copy machine

ppm = parts per million

CP = cleaning products

HS = hand sanitizer

PF = personal fan

µg/m<sup>3</sup> = micrograms per cubic meter

DEM = dry erase materials

ND = non detect

**Comfort Guidelines**

Carbon Dioxide: < 800 ppm = preferred

> 800 ppm = indicative of ventilation problems

Temperature: 70 - 78 °F

Relative Humidity: 40 - 60%

**Location: DCAMM Energy Group**

**Indoor Air Results**

**Address: One Ashburton Place, Boston, MA 16<sup>th</sup> floor**

**Table 1 (continued)**

**Date: 4/14/2017**

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m <sup>3</sup> )	Occupants in Room	Windows Openable	Ventilation		Remarks
								Supply	Exhaust	
Wilmer	486	ND	73	18	5	1	N	Y	Y	PFs
Empty office	487	ND	73	18	5	0	N	Y	Y	DEM
Freeley	500	ND	73	18	5	0	N	Y	Y	Mouse trap behind cube wall
Empty cube	535	ND	73	19	5	0	N	Y	Y	
Crisley	534	ND	73	19	5	1	N	Y	Y	
Lillis	552	ND	73	19	6	0	N	Y	Y	Plants, HS
Reinhardt	534	ND	73	19	5	0	N	Y	Y	PF
Ransom (office)	551	ND	73	19	5	1	N	Y	Y	

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